PC100 SDRAM Component Testing Summary

As part of Intel's enabling process, the following test/characterization procedure has been implemented on PC100 SDRAM components. A small sample of components (2-5 devices) have been tested under the conditions described in Table 2.

The list of suppliers whose components have passed are listed in Table 1. If devices were found to be marginal to certain parameters, please see the comment section in the Table. The results are an indication of testing under conditions described in Table 2. The characterization testing is not related to validation/qualification, and is not required for production testing. The low density (i.e. 16M and 64M) device testing data are no longer updated as of September, 1998. Intel continues to test high density (128M and 256M) devices.

Smart Modular Technologies has the capability of performing the test/characterization. Smart Modular Technologies can also perform:

- component characterization
- DIMM testing on tester
- DIMM testing on mother board

For component or DIMM testing at Smart Modular Technologies, please contact:

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Table1 - Component Supplier Table

Supplier	Device	Part Number/Date Code	Comment
Samsung	256M - 64Mx4	KM44S64230AT-GL 9838	pass all parameters tested
Infineon	256M - 32Mx8	HYB39S256800T-8 9837	pass all parameters tested
Hyundai	128M - 32Mx4	HY57V1294020 9824	pass all parameters tested
Samsung	128M - 32Mx4	KM44S32030T 9825	pass all parameters tested
Samsung	128M - 16Mx8	KM48S16030T 9822	pass all parameters tested
Toshiba	128M - 16Mx8	TC59SM708FT-80 9835	pass all parameters tested
Toshiba	128M - 8Mx16	TC59SM716FT-80 9838	pass all parameters tested
Fujitsu	16M - 2Mx8	MB81F16822B102FN 9810	pass all parameters tested
Genesis	16M - 2Mx8	GS148C2M8A1 09NJ40	pass all parameters tested
Hyundai	16M - 2Mx8	HY57V168010C TC-10S 9801TA HY57V168010CTC-10P 9807	pass all parameters tested
LG	16M - 2Mx8	GM72V16821DT-7K 9809	pass all parameters tested
Mitsubishi	16M - 2Mx8	M5M4V16S30DTP-8 811	pass all parameters tested
NanYa	16M - 2Mx8	NT56V1680A0T ES E73600302A 47NJ19	pass all parameters tested
OKI	16M - 2Mx8	M56V16800E-8TS 9816	pass all parameters tested
Samsung	16M - 2Mx8	KM48S2020CT-GL ES 807	pass all parameters tested
Infineon	16M - 2Mx8	HYB39S16800CT-8 C9822	pass all parameters tested
TI	16M - 2Mx8	TMX626812BDGE5M 82A1TO P	pass all parameters tested
Fujitsu	64M - 8Mx8	81F64842B-103FN 9750 K01R1	pass all parameters tested
Hitachi	64M - 8Mx8	HM5264805TT-B60 9748	pass all parameters tested
Hyundai	64M - 8Mx8	HY57V658020ALTC-10P9749TA K0021E HY57V658020ATC-10S 9805	pass all parameters tested
IBM	64M - 8Mx8	0364804CT3B-260 9830	pass all parameters tested
LG	64M - 8Mx8	GM72V66841CT-7J 9748	pass all parameters tested
Mitsubishi	64M - 8Mx8	M5M4V64S30ATP-8 806	pass all parameters tested
Mosel-Vitelic	64M - 8Mx8	V54C365804VBT8PC 9832	pass all parameters tested
NEC	64M - 8Mx8	D4564841G5-A10-9JF 9812	pass all parameters tested
NPNX	64M - 8Mx8	NN5264805TT-B60 9822	pass all parameters tested
OKI	64M - 8Mx8	MD56V62800A-8 9818	pass all parameters tested
Samsung	64M - 8Mx8	KM48S8030BT-GL 801	pass all parameters tested
Infineon	64M - 8Mx8	39S64800AT 9812	pass all parameters tested
TI	64M - 8Mx8	TMX664814A81A7ET	pass all parameters tested
Toshiba	64M - 8Mx8	A56877 9750KBD TC59S6408BFT-80	pass all parameters tested
Fujitsu	64M - 4Mx16	81F641642B-103FN 9805 MOO	pass all parameters tested
Hitachi	64M - 4Mx16	HM5264165TT-B60 9751	pass all parameters tested
Hyundai	64M - 4Mx16	HY57V651620ATC-10P 9803 HY57V651620ATC-10S 9805	pass all parameters tested
LG	64M - 4Mx16	GM72V661641CT-7J 9806	pass all parameters tested
Mitsubishi	64M - 4Mx16	M5M4V64S40ATP-8 810	pass all parameters tested
NEC	64M - 4Mx16	D4564163G5-A10-9JF 9803E9001	pass all parameters tested
Samsung	64M - 4Mx16	KM416S4030BT-GL 807	pass all parameters tested
Infineon	64M - 4Mx16	HYB39S64160AT-8 9830	pass all parameters tested
Toshiba	64M - 4Mx16	TC59S6416BFT-80 9806	pass all parameters tested

Table 2. 100Mhz SDRAM Critical Parameters Test List

The list of critical parameters tested are access times, setup and hold times, drive strengths, input capacitances and input clamp characteristics. Test conditions are as follows:

Condition A: Vcc=3.6v, Ta=0C
Condition B: Vcc=3.0v, Tc= 85C

Parameter	**units**	**Intel Spec**		**Test Conditions**
Timing **		**min**	**max**	
Tac	ns		6	50pf load,Condition A,B
Toh	ns	3		50pf load,Condition A,B
Tset (all inputs) (need per pin results)	ns		2	Condition A,B
Thold (all inputs) (need per pin results)	ns		1	Condition A,B
Tras	clk		5	in functional pattern
Trcd	clk		2 or 3	in functional pattern
Trp	clk		2 or 3	in functional pattern
CL	clk		2 or 3	in functional pattern
Cin (Clk)	pf	2.5	4	1Mhz, 23C, 1.4v bias, 200mv peak to peak, VCC=3.3v
Cin (other inputs)	pf	2.5	5	1Mhz, 23C, 1.4v bias, 200mv peak to peak, VCC=3.3v
Cin (data pins)	pf	4.0	6.5	1Mhz, 23C, 1.4v bias, 200mv peak to peak, VCC=3.3v
vil	ns		0.8	
vih	ns	2.0v		Run worse case 100Mhz pattern at speed
Data Out I/V	ma	attached curve see fig.3 and 4	attached curve see fig.3 and 4	Conditions A, B
Vss/Vcc Clamp I/V (on DQ, CS, WE, CKE)	ma	attached curve see fig.1 and 2		Vss=0v, Vcc=3.6v

Clamp and I/O driver I/V characteristics

VSS	I(ma)
-2.6	-57.23
-2.4	-45.77
-2.2	-38.26
-2	-31.22
-1.8	-24.58
-1.6	-18.37
-1.4	-12.65
-1.2	-7.57
-1	-3.37
-0.9	-1.75
-0.8	-0.58
-0.7	-0.05
-0.6	0
-0.4	0
-0.2	0
0	0

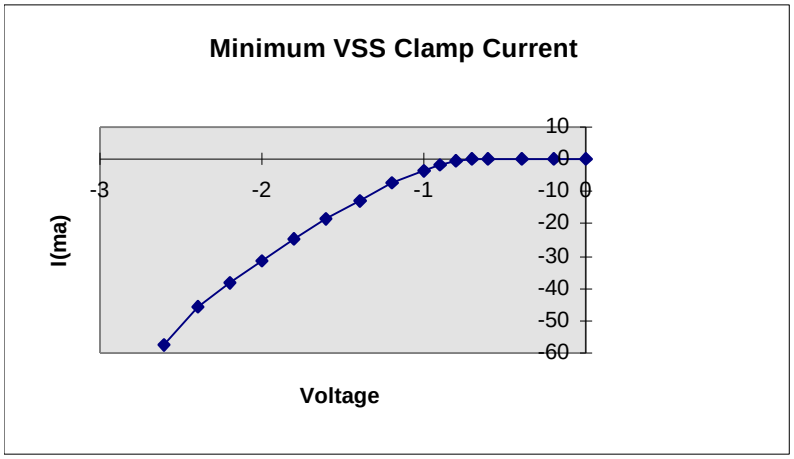


Figure 1: SDRAM VSS Clamp Characteristics

Notes:

1. Required for CK, CS, DQMB, DQ and CKE pins.
2. Must meet the temperature and voltage range specified above.
3. This drawing is not to scale. Comparisons should be made to the data table provided.

VCC	I(ma)
2.6	18.31
2.4	15.3
2.2	12.48
2	9.83
1.8	7.35
1.6	5.06
1.4	3.02
1.2	1.34
1	0.23
0.9	0
0.8	0
0.7	0
0.6	0
0.4	0
0.2	0
0	0

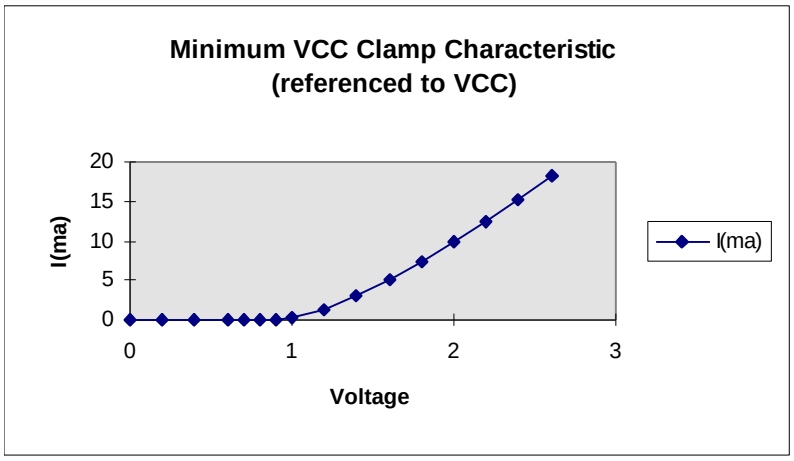


Figure 2: SDRAM VCC Clamp Characteristics

Notes:

1. Required for CK, CS, DQMB, DQ and CKE pins.
2. This data is referenced to the VCC voltage.
3. Must meet the temperature and voltage range specified above.
4. This drawing is not to scale. Comparisons should be made to the data table provided.

Pull-Down			
Voltage (V)	I (mA) 100 min	I (mA) 100 max	I (mA) 66 min
0	0.0	0.0	0.0
0.4	27.5	70.2	17.7
0.65	41.8	107.5	26.9
0.85	51.6	133.8	33.3
1	58.0	151.2	37.6
1.4	70.7	187.7	46.6
1.5	72.9	194.4	48.0
1.65	75.4	202.5	49.5
1.8	77.0	208.6	50.7
1.95	77.6	212.0	51.5
3	80.3	219.6	54.2
3.45	81.4	222.6	54.9

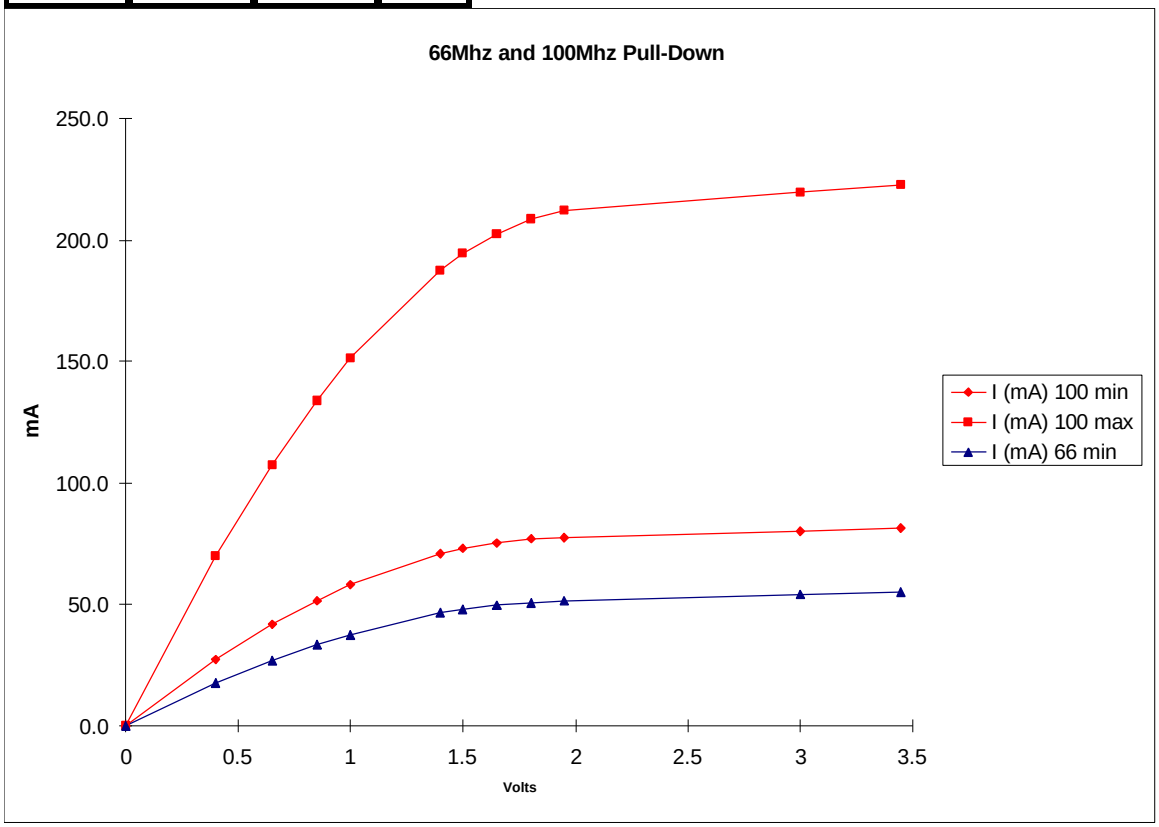


Figure 3: SDRAM DQ Output Buffer Pull-Down Characteristics

Notes:
1. Must meet the temperature and voltage range specified above.
2. This drawing is not to scale. Comparisons should be made to the data table provided.

Pullup			
Voltage	100Mhz min	100Mhz max	66Mhz min
(V)	I(ma)	I(ma)	I(ma)
3.45		-2.4	
3.3		-27.3	
3	0	-74.1	-0.7
2.6	-21.1	-129.2	-7.5
2.4	-34.1	-153.3	-13.3
2	-58.7	-197	-27.5
1.8	-67.3	-226.2	-35.5
1.65	-73	-248	-41.1
1.5	-77.9	-269.7	-47.9
1.4	-80.8	-284.3	-52.4
1	-88.6	-344.5	-72.5
0	-93	-502.4	-93

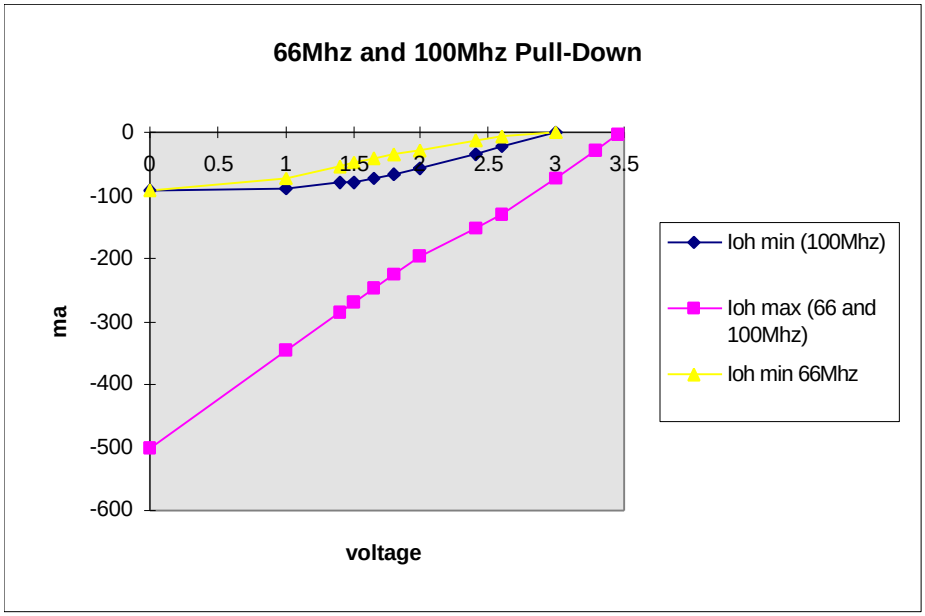


Figure 4: SDRAM DQ Output Buffer Pull-Up Characteristics (For VCC = 3.0v - 3.45v)

Notes:
1. Must meet the temperature and voltage range specified above.

This drawing is not to scale. Comparisons should be made to the data table provided.

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